



New record of *Marmosa (Stegomarmosa) andersoni* Pine, 1972 (Didelphimorphia, Didelphidae), a rare and endemic Peruvian marsupial

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Abstract

Marmosa (Stegomarmosa) andersoni Pine, 1972 is one of the rarest members of the genus *Marmosa*. This species is endemic to southeastern Peru and currently known from only 3 close localities in Cusco. Herein we report a new record for the species from Pasco, which extends its geographic distribution by 360 km and represents its northernmost record.

Key words

Eastern Andean forest, distribution, Peruvian mammals, range extension.

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Introduction

The genus *Marmosa* Gray, 1821, includes a diverse group of species of South American marsupials which contain 19 recognized species (Voss et al. 2014). However, several of them appear to be species complexes (Tate 1933, Anderson 1997, Patton et al. 2000, Patton and Costa 2003, Creighton and Gardner 2007). At present, based on molecular evidence, 5 subgenera are recognized (Voss et al. 2014). One of them, *Stegomarmosa* Pine 1972, contains 2 species, *Marmosa lepida* (Thomas, 1888) and *M. andersoni* Pine, 1972 (Voss et al. 2014). Since its discovery, *M. (Stegomarmosa) andersoni* drew attention for the

great development of its postorbital processes, similar to those presented by *Caluromys* (Reig et al. 1987), for its narrow interorbital constriction, and for the unique arrangement of tail hairs (Pine 1972), which earned its assignment to a subgenus of its own.

Among *Marmosa* species, *M. andersoni* is one of the rarest species with just 3 close localities reported, and only known by 7 specimens (Solari and Pine 2008). In fact, its conservation status is considered as Data Deficient by IUCN Red List, in view of insufficient knowledge of its ecology and distribution (Solari 2015).

Marmosa andersoni is endemic to southern Peru (Solari and Pine 2008), described based on 1 adult male

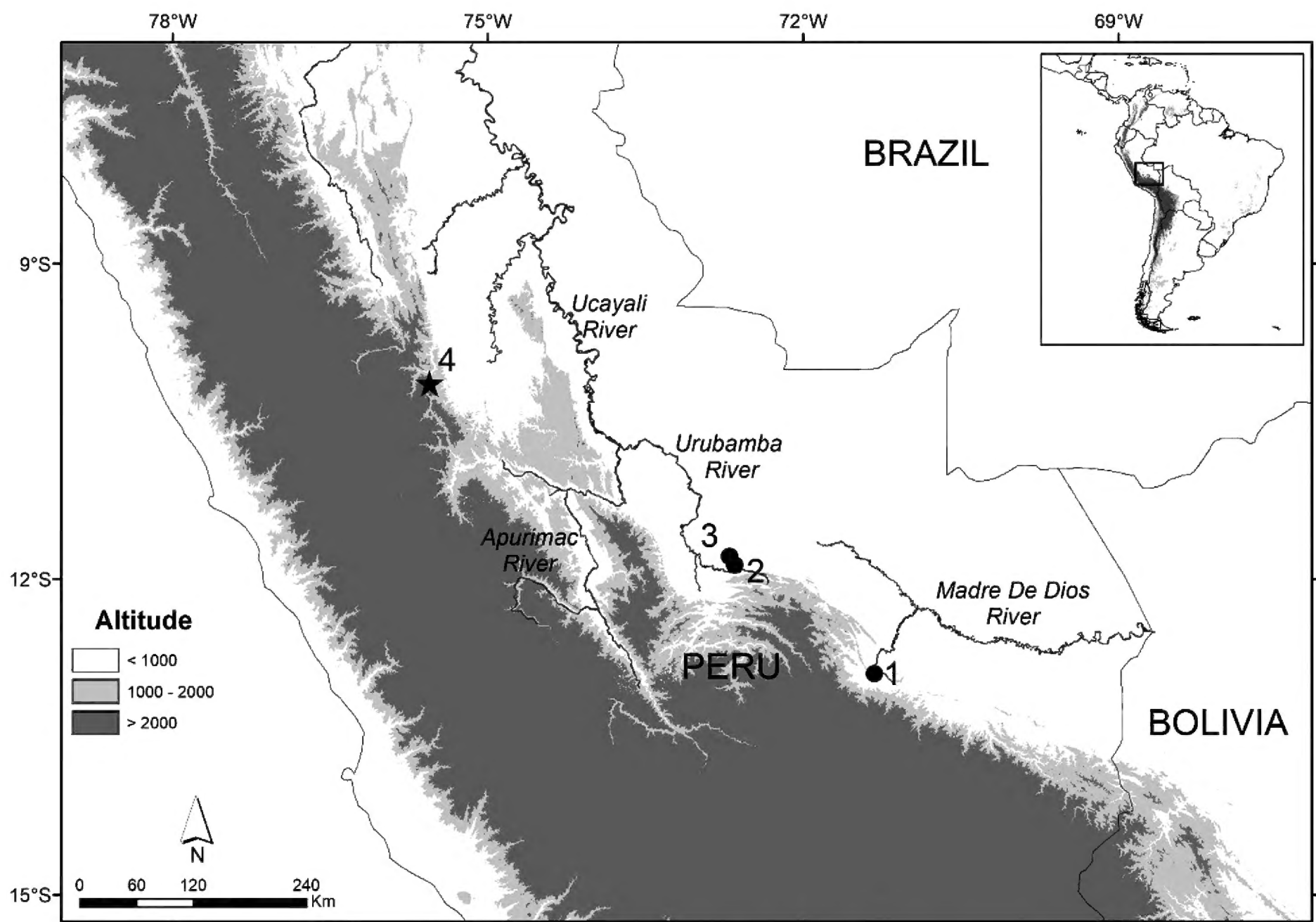


Figure 1. Distribution map of *Marmosa (Stegomarmosa) andersoni*. Previous records in Cusco (black dots: 1. Hacienda Villa Carmen, type locality; 2. Cashiriari; 3. San Martín) (Pine 1972, Solari and Pine 2008). New record (black star) in Pasco.

specimen collected in Hacienda Villa Carmen, Cosñipata [Valley], Paucartambo, Cusco ($12^{\circ}52' S$, $071^{\circ}15' W$; 600 m) (Heshkovitz 1960, Pine 1972). Six additional specimens (2 adult females and 4 juveniles) were recorded in 2 neighboring localities, Cashiriari 3 well-site ($11^{\circ}52' S$, $072^{\circ}39' W$, 694 m) and San Martín ($11^{\circ}47' S$, $072^{\circ}42' W$, 474 m) Camisea, La Convención Province, Cusco, about 200 km north-west of the type locality (Solari and Pine 2008). Herein, we report a new locality for the species which depicts its northernmost record.

Methods

The new specimen of *M. andersoni* was collected by one of the authors (HC), a park-ranger of Yanachaga Chemillén National Park, who found the specimen lying dead on a trail near the Huampal Control Station. The specimen, an adult male, was catalogued in the Scientific Collection associated with the Museo de Historia Natural of the Universidad Nacional de San Agustín with the catalog number MUSA 6542, preserved in alcohol and with its skull removed (Fig. 2).

External and cranial measurements of the specimen were taken following Solari and Pine (2008), Pine (1972), Patton et al. (2000) and Voss et al. (2001): Total length (TL), tail length (LT), hind paw length (HF), ear length (E) and weight (W) in grams, head and body length (HBL) was obtained by subtracting LT from TL.

Craniodental measurements (Table 1): condyle basal length (CBL), minor interorbital breadth (LIB), zygomatic breadth (ZB), palatal width (PB), upper molar toothrow (MTR), molar length (LM), palatal length (PL), length of upper 3 first molars (M1-M3), maximum width between third molars (M3-M3), molar row of the mandible (MDTL).

Results

New record. Peru: Pasco: Oxapampa Province: Huampal Control Station ($10^{\circ}11'03'' S$, $075^{\circ}34'27'' W$, 1100 m elev., Fig. 1), adjacent to Quebrada Honda, Huanca-bamba River.

Identification. The specimen exhibits the following combination of diagnostic characters described by Pine (1972), and Solari and Pine (2008): postorbital processes exceptionally developed, measuring 10.1 mm between their ends and protruding 2.8 mm from their base, forming a triangular flange or shield (Fig. 2); strongly constricted interorbital area; exceptionally large orbits; ascending ramus of the dentary forming an unusually obtuse angle with the horizontal body of the dentary; lower canine procumbent and apically laterally flattened. In our specimen, however, the first lower pre-molars are not in broad contact with the lower canines (Fig. 2), as reported for most specimens of this taxon. Some variation regarding the contact between the first



Figure 2. Dorsal and ventral views of the cranium and lateral view of the cranium and mandible of an adult male of *Marmosa (Stegomarmosa) andersoni* (MUSA 6542), collected in the Quebrada Honda, Huampal, Pasco, Peru. Scale bar = 10 mm.

lower premolar and the lower canine has been previously reported (Solari and Pine 2008), and the present record indicates a greater variation in this character than previously known for the species. Palatal fenestrations are partially perforated, with the right side of the palate fenestrated from the middle of M1 to M2, and the right side from the middle of P3 to the posterior border of M2 (Fig. 2). A throat gland is present, as well as the tail dorsally almost naked but with the presence of bristles ventrally on either side (Fig. 3B). These bristles are brown and short in the basal part of the tail and form a well-developed fringe of long silvery bristles distally (Fig. 3C, D). Pattern of scales of tail ranging from annular to spiral (Fig. 3E). Moreover, the specimen from Pasco (MUSA 6542) exhibits slight differences (less than 1 mm) in some cranial measurements (condyle basal length, minor interorbital, zygomatic breadth, palatal length, palatal width, upper molar toothrow, maximum width between third molars; see Table 1) that could be considered as intraspecific variation.

Discussion

The geographic distribution of *M. andersoni* expands 360 km to the northwest and its upper elevational limit up to 1100 m a.s.l. This update of its distribution suggests

that *M. andersoni* inhabits several forest types, such as lowland tropical rainforest (previous records, Solari and Pine 2008) and montane pluvial forest of the Yungas (following Olson et al. 2001, this record).

The presence of *M. andersoni* in central Peru is expected due to the geographic continuity of the central and southeastern Andean forest. A general pattern emerges for the several species of fauna and flora along these forests, the geographic ranges of many Andean species are much longer than wide (Young 2007, Patter-son et al. 2012). In mammals, the species that follow this pattern have a wide variability in terms of their loco-motory habits and dispersal capacity (cursorial, semifosso-rial, scansorial, arboreal, and flying), and include other marsupials species, such as: *Gracilinanus aceramarcae* (Tate, 1931) (Creighton and Gardner 2007), *Marmos-ops juninensis* (Tate, 1931) (Peralta and Pacheco 2014), *Monodelphis osgoodi* Doult, 1938 (Pine and Handley Jr 2007), *Lestoros inca* (Thomas, 1917) (Myers and Patton 2007); myomorph rodents: *Akodon torques* (Thomas, 1917) (Pardiñas et al. 2015), *Lenoxus apicalis* (Allen, 1900) (Patton 2015), *Nephelomys keaysi* (Allen, 1900) (Percequillo 2015), *Oecomys phaeotis* (Thomas, 1901) (Carleton and Musser 2015), *Rhagomys longilingua* Luna and Patterson, 2003 (Medina et al. 2017), *Thomas-omys daphne* Thomas, 1917, *T. gracilis* Thomas, 1917 (Pacheco 2015); hystricomorph rodents: *Dasyprocta kalinowskii* Thomas, 1897 (Patton and Emmons 2015a), *Cuscomys* spp. Emmons, 1999 (Patton and Emmons 2015b), *Dactylomys peruanus* Allen, 1900 (Emmons et al. 2015), *Isothrix barbarabrownae* Patterson & Velazco, 2005 (Patterson and Velazco 2008); and even bats such as *Carollia manu* Pacheco, Solari & Velazco, 2004 (Pacheco et al. 2004). Thereby this region harbors a rich

Table 1. External and cranial measurements (mm), and weight (g) for 4 adult specimens of *Marmosa (Stegomarmosa) andersoni*. Previous records (*) were obtained from Solari and Pine (2008), that includes: Field Museum, Chicago (FMNH 84252), and Museo de Historia Natural, Universidad Nacional Mayor de San Marcos, Lima (MUSM 14254, 14155); and the new record from Pasco (MUSA 6542).

	FMNH 84252 Holotype* ♂	MUSM 14154* ♀	MUSM 14155* ♀	MUSA 6542 ♂
TL	—	317	300	303
LT	181	193	175	176
HBL	—	124	125	127
HF	20.3	20	22	21.1
E	16.9	20	20	18.2
W	—	28	38	—
CBL	32.9	33.5	33.8	31.8
LIB	4.3	3.6	4.2	4.1
ZB	18.7	18.3	18.9	19.7
PL	18.8	17.9	18.1	17.6
PB	10.3	10	10.4	9.5
MTR	13.1	13	13.3	12.7
LM	6.7	6.5	6.7	6.6
M1-M3	5.6	5.5	5.7	5.7
M3-M3	9.9	9.7	10	9.3
MDTL	15	15	15.1	15.1

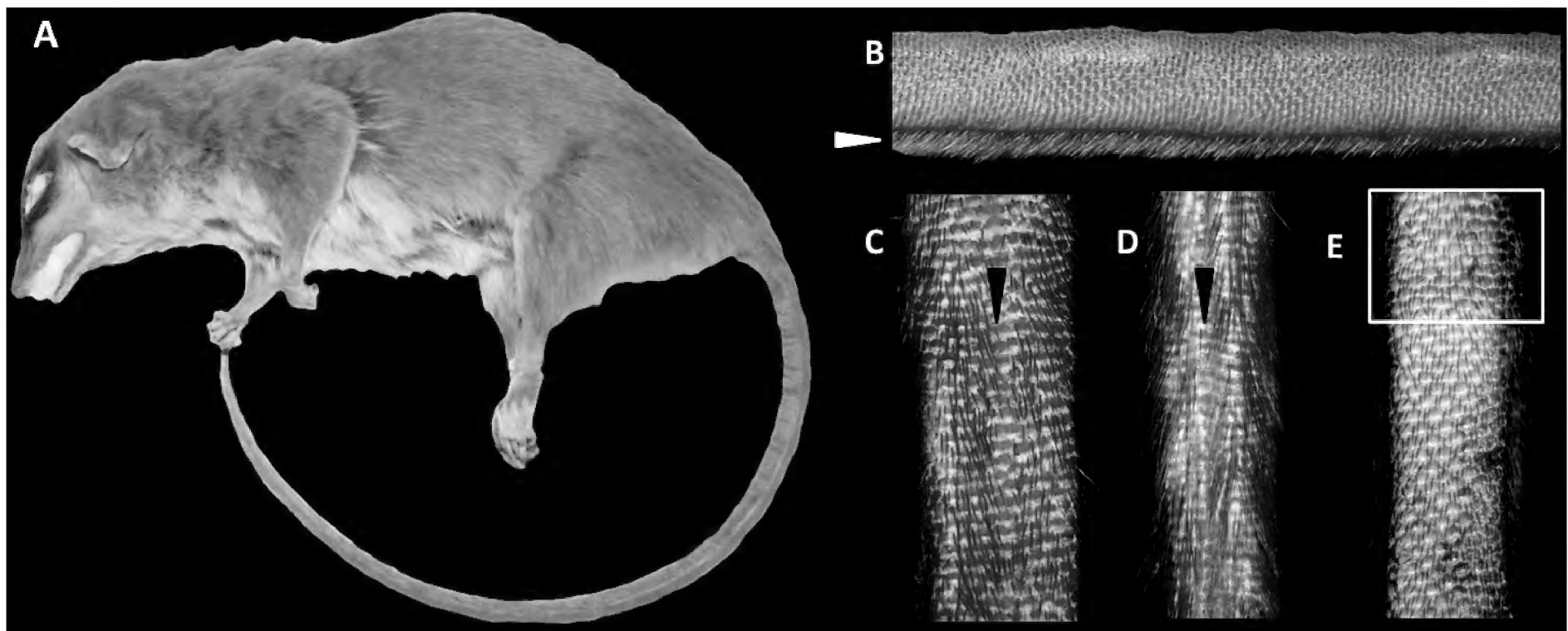


Figure 3. Lateral view of the skin of *Marmosa (Stegodermosa) andersoni* (MUSA 6542). **B.** Lateral view of the distal portion of tail showing a well-developed fringe of silver bristles. **C, D.** Ventral view of the basal and distal portions of tail point out the variation of the color and size of the bristles and the mid-ventral naked pattern (see text for detail description). **E.** Dorsal view of tail illustrating the pattern of scales ranging from annular (inside white square) to spiral.

endemic fauna and flora, depicting one of the major centers of endemism around the world (Young 2007, Patterson et al. 2012), awakening the interest of researchers for several years, to understand the origin of this pattern and the biogeographic history of the species that inhabit this region and the related lowlands species (Hershkovitz 1972, Patton and Smith 1992, Bates and Zink 1994, Fjeldså and Rahbek 2006, Brumfield and Edwards 2006, Hughes and Eastwood 2006, Patterson and Velazco 2008, Patterson et al. 2012).

Although we show an extension of distribution for *M. andersoni*, we consider that it remains a rare species (see Rabinowitz et al. 1986). This is an endemic species, known for a small area of distribution, and there are only few scarce records even though several surveys have been performed near the known localities (Pacheco et al. 1994, Medina et al. 2012, Solari et al. 2006, Peralta and Pacheco 2014). Moreover, nothing is known about the state of its populations and natural history.

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Authors' Contributions

HZ and LHC collected the data the field; AP and KP made the figures; HZ identified the specimen; all authors wrote the manuscript.

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